CHAL 0178
Cy 1 of 6

28 May 1958

MEMORANDUM TO: Special Assistant to the Director
for Planning and Development

SUBJECT : C-Camera Development

REFERENCES : A. Trip Report from the Director of Operations, dated 3 April 1958 (SAPC #26085)

B. Memorandum from the SA/PD/DCI, dated 19 May 1958 (DPS 0025/A)

1. The evaluation of the C-camera completed by Perkin-Elmer Corporation on 15 May 1958, indicates that with certain modifications a resolution of from 15 to 25 lines per mm can be obtained. Additional improvements after flight testing of the system can increase this figure appreciably. Considering the additional photographic scale available with this system, a minimum resolving power of 20 lines per mm would be acceptable for certain operational missions. Any increase beyond 20 lines per mm would expand both the versatility and capability of our photo intelligence collection effort. I have in mind the peripheral type operations as well as recoverage of previously photographed targets. HTAUTOMAT has a number of targets in this latter category, where greater photographic scale is needed to verify or expand technical intelligence information obtained on previous missions.

2. In view of the money and effort already expended on the C-camera and considering Perkin-Elmer's optimistic viewpoint, substantiated by their evaluation, I recommend continued project interest pending successful flight test of the modified cameras. I feel that continued emphasis on development of the "C" camera system is further justified by the fact that any increase in performance of follow-on aircraft will necessitate a commensurate increase in the capability of camera equipment. The long focal length of the "C" will provide the increased photographic collection capability needed for GUSTO. If flight test of the equipment is successful and provided the camera system can be effectively mated with a guidance system, I recommend procurement of two of the completed systems from the Air Force.

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3. The attached trip report compiled by [redacted] outlines in detail the fixes required and agreed to by Perkin-Elmer and Hycon in order to improve quality of C-camera results. (Copies of Hycon's summary report, Perkin-Elmer Corporation's evaluation and examples of recent "C" photography have been forwarded to the Project Director under separate cover.)

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[redacted]
Director of Operations

Attachment:
Trip Rpt - W-P AFB

(Over)

28 May 1958

MEMORANDUM TO: Special Assistant to the Director
for Planning and Development

SUBJECT : Trip Report - Wright-Patterson Air Force Base

25X1A 1. On 22 and 23 May, [redacted] attended a meeting at Wright-Patterson AFB to confer with Lt. Col. Sid Brewer and Perkin-Elmer and Hycon Representatives concerning future development of the "C" camera configuration. In addition to the undersigned personnel, and
25X1A [redacted] of the Project Staff, the following individuals were present during formal portions of discussions:

Air Force	Perkin-Elmer	
Lt. Col. S. W. Brewer Lt. Col. Russ Herrington Mr. Floyd Redding	Dr. Roderic Scott [redacted]	25X1A

Hycon

25X1A [redacted]

2. Lt. Col. Brewer opened the discussion by stating the purpose of the meeting as: (1) Review progress to date on "C", and to ascertain what is left to be accomplished, (2) to seek agreement between P & E and Hycon as to what mechanical or optical fixes should be made in the immediate future, (3) to set a goal (resolution-wise) which would be the minimum acceptable and, (4) to assign tasks to P & E and/or Hycon as appropriate. Coincident with this latter item was the question of continuation or renewal of the existing contract or revision of terms and writing of a new agreement.

3. During the past six weeks, P & E has been engaged in evaluating the status of the "C" camera. This evaluation is based upon the summary of activities and tests to date provided by Hycon, by P & E knowledge and observation of the equipment and by studies conducted by independent consultants and vibration experts called in by P & E to assist in this evaluation.

4. In brief summary, P & E's evaluation disclosed the following:

a. "C" optical system is theoretically capable of producing 60 lines per mm, however, vibration, frosting, film sensitivity and processing will lower this considerably. Dr. Scott stated that 54 lines have been photographed (in the lab) with the #2 set of "C" optics.

ENCLOSURE #1
[redacted] SECRET 0178

b. P & E's study was confined to camera mechanical and optical systems problems; problems to be imposed by aircraft vibrations, turbulence, etc. was approximated.

c. Isolation of vibration features was attempted by introducing, either independently or simultaneously, the vibration induced by shutters, rewind mechanism, etc. This study disclosed that both the primary and "G" mirror are sensitive to vibration influences.

d. Excessive oscillation exists in the stabilization loop.

e. The camera housing is flexible due to mechanical softness of hardware; this feature complicates stabilization.

f. An examination of the effect of various types of film emulsions (other than SO 1153), indicates possible need for different emulsion with "C" camera. SO 1153 will be capable of recording 20/25 lines per mm.

g. Effect of thermal disturbances and temperatures within equipment bay. Although "C" camera is insulated by Mylar bag, bay temperatures (freezing at ports to 65° F in upper portions of bay) may have adverse effect on camera resolving power.

h. There is a need for "cleaning up" the 300 inch collimators in order to standardize results obtained with the "C" camera.

5. Hycon posed no major objection to any points mentioned in the Perkin-Elmer evaluation.

6. A discussion of the mechanical, optical and other fixes to be accomplished resulted in the following agreements.

a. 300" collimator to be reworked.

b. Primary mirrors to be remounted, using three point edge suspension instead of center post.

c. Stiffening of "G" mirror suspension.

25X1A d. Acquisition of [redacted] data--to be accomplished by combination of simulation of bay temperatures on ground and audio and other vibration instrumentation during flight test of #4 camera (#2 set optics).

e. Remove rubber motor mounts--present mounts amplify vibration.

f. Investigate installation mechanical dampers on H, I and primary mirrors.

g. Re-position servo and cager cut-off.

h. Aircraft isolator (between end of mount attaching camera to aircraft superstructure and camera gimbal).

i. Stiffen torque solenoid brackets.

7. Perkin-Elmer proposes that they be given primary responsibility for future flight test of the "C" camera. Rod Scott presented a paper listing the composition (personnel-wise) of his proposed flight test team and a listing of joint P & E/Hycon responsibilities. Under Scott's proposal P & E would be responsible for analyzing take, accomplishing necessary instrumentation, rendering status reports, serving as focal point (and final authority) on incorporating additional or different modifications and for maintenance and adjustment of optical system and for collimation of equipment. Rod proposes the P & E team consist of a senior field engineer and two junior engineers. Under this proposal, the Senior Hycon Field Engineer would report to the Senior P & E Representative, Hycon would be responsible for: loading of film and loading configuration in aircraft, preflight and postflight, processing of test film, preparation of auxilliary instrumentation and processing of results, recommendation to P & E of fixes based on on-the-spot observations.

Note: If P & E will provide personnel as indicated, Dr. Scott's proposal appears logical and it is recommended that it be accepted.

8. Pending agreement of all parties on future contractual arrangements, Lt. Col. Brewer authorized P & E and Hycon to continue with "C" development. Perkin-Elmer and Hycon to get together on all items to decide which Company is to accept responsibility. If Perkin-Elmer and Hycon can proceed simultaneously, the first "C" (#4 camera with #2 optics) should be ready for flight test by 30 July.

9. It was recommended that continued emphasis be placed on mating of the "C" camera with a guidance system. The camera will be practically unuseable without a means of mating the memory device programmer, drift sight combination to provide the pilot a means of pointing the equipment at a given target. To date, mating the camera/guidance system together has been unsuccessful on the two flight tests on which it has been tried.

10. Resolution-wise, it was recommended that 20 lines per mm (average contrast resolution) be considered the minimum acceptable and that Perkin-Elmer and Hycon efforts be directed toward this goal.

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